CLAIMS

1. An optical waveguide device comprising:

a substrate composed of a nonlinear optical material and

a periodically domain-inverted structure having the same composition as the nonlinear optical material, wherein

the domain-inverted structure has a refractive index distribution relying on the domain-inverted structure.

2. The optical waveguide device according to claim 1, wherein the domain-inverted structure is formed by applying a voltage in a polarization direction of the substrate.

3. The optical waveguide device according to claim 1, wherein the substrate composed of a nonlinear optical material is an offcut substrate.

4. The optical waveguide device according to claim 3, wherein the substrate has an offcut angle inclined in a range of 1° to 10° with respect to the substrate surface.

5. The optical waveguide device according to claim 1, wherein the substrate is a thin film, having an optical substrate bonded via a bonding layer to one face of the substrate.

6. The optical waveguide device according to claim 5, wherein at least either the surface or a back face of the substrate is provided with a convex, and the domain-inverted structure is formed in stripes at the convex.

7. The optical waveguide device according to claim 1, wherein the nonlinear optical material is a Mg-doped $LiNb_{(1-x)}Ta_xO_3$ ($0 \leq x \leq 1$).

8. The optical waveguide device according to claim 1, wherein the nonlinear optical material is a Mg-doped $LiNbO_3$ crystal, a phase matching wavelength harmonizes with a Bragg reflection wavelength, and the Bragg reflection wavelength λ satisfies a relationship of $\lambda_1 < \lambda < \lambda_2$ when $\lambda_1 = 635 + 48 \times n$ (nm), $\lambda_2 = 1.02 \times \lambda_1$ (nm) where ($n = 0, 1, 2$), or $\lambda_1 = 774$ nm $+ 40 \times n$ (nm), $\lambda_2 = 1.02 \times \lambda_1$ (nm) where ($n = 0, 1, 2, 3, 4\ldots$).

9. The optical waveguide device according to claim 1, wherein the nonlinear optical material is a Mg-doped $LiNbO_3$ crystal, a phase matching wavelength harmonizes with a Bragg reflection wavelength, and the Bragg reflection wavelength λ satisfies a relationship of $\lambda_1 < \lambda < \lambda_2$ when $\lambda_1 = 613 + 48 \times n$ (nm), $\lambda_2 = 1.02 \times \lambda_1$ (nm) where ($n = 0, 1, 2$), or $\lambda_1 = 754$ nm $+ 40 \times n$ (nm), $\lambda_2 = 1.02 \times \lambda_1$ (nm) where ($n = 0, 1, 2, 3, 4\ldots$).

10. The optical waveguide device according to claim 1, wherein the domain-inverted structure is composed of a wavelength-converting portion and a DBR portion, and the phase matching wavelength of the wavelength-converting portion is equal to the Bragg reflection wavelength of the DBR portion, and a difference between the phase matching wavelength of the wavelength-converting portion and the Bragg reflection wavelength of the wavelength-converting portion is at least 5 nm.

11. A coherent light source comprising a semiconductor laser and an optical waveguide device according to any one of claims 1-10, where a light beam emitted from the semiconductor laser enters the optical waveguide

device.

12. An optical apparatus comprising the coherent light source according to claim 11.